DOCUMENT RESUME

ED 158 741 IR 006 299

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TITLE Continuing Health Education Through Computer Technology.
PUB DATE 76
NOTE 11p.; Paper presented at the Health Education Medical Conference (Miami, Florida, 1976)

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS *Computer Assisted Instruction; *Credit Courses; Field Studies; *Health Education; Health Personnel; Physicians; *Professional Continuing Education; *Simulation
IDENTIFIERS Project MERIT

ABSTRACT

Computer assisted instruction is beginning to have an important role in the rapidly expanding field of continuing education for health science professionals. At the present time, there are 22 medical specialty boards, all of which require or are about to require some form of continuing medical education for re-certification, and studies are being conducted throughout the country to determine the feasibility of using computer based education for obtaining continuing education credits in the health sciences. Computerized clinical case simulations, which offer some interesting advantages over traditional forms of continuing education, can be accessed from Massachusetts General Hospital and Ohio State University on a 24-hour basis. The Health Education Network offers courseware to medical, nursing, and dental schools, hospitals, and health care institutions throughout the U.S. and Canada. The prospects of using computer technology to obtain continuing health education credit are very real and feasible compared to other means--the costs are reasonable, accessibility to computer based education systems is increasing, and the quality and quantity of computerized case simulations are rapidly improving. (Author/CMV)

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CONTINUING HEALTH EDUCATION THROUGH COMPUTER TECHNOLOGY

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PRESENTED AT: Health Education Media Conference
1976, Miami, Florida

IR006299

Continuing Education in the Health Sciences is becoming a rapidly expanding field for all health professionals. Presently, continuing education for the health professional is primarily voluntary. However, this situation appears to be rapidly changing with both state and federal regulations relative to relicensure and recertification of health professionals a near certainty in the future. These regulations have been already implemented in some areas of the country. We have seen a rapid increase in continuing education courses for physicians during the past 15 years. [1]During the year 1961-1962, a total of 1,105 continuing medical education courses was reported. 55% of these courses were conducted by medical schools, 9% by hospitals. During the next ten years, these courses have more than doubled. During 1970-1971 a total of 2,319 continuing medical education courses were offered. However, the percentage of courses offered by medical schools had decreased to 35% and the courses offered by hospitals had increased to 16%. During the next six years, continuing medical education courses again more than doubled. During 1976-1977, there were 5,800 certified courses being offered. 40% of these courses were offered by medical schools, 23% by hospitals. The additional courses unaccounted for by the medical school and hospital statistics were offered by the medical speciality boards, and other organizations. Counting those courses not certified by speciality boards, over 10,000 courses were given in this country in continuing medical education during the 1976-1977 year. At the present time, there are 22 medical speciality boards, all of which require or are about to require some form of continuing medical education for re-certification. These programs have been certified by the American Medical Association for continuing medical education credit but it is the individual medical hospital and health related institutions which become accredited for the delivery of these continuing medical education courses and can given appropriate credit hours.

In order to obtain the AMA Physician Recognition award, a physician must obtain 150 hours of accredited course work which can be distributed among six different categories. In order to obtain the minimum 60 hours of category I credits, the regulations require that the sponsoring organization must have a procedure for verifying physician participation. Other forms of credit categories, II-VI, do not require verification by an organization. The categories may be defined as follows:

Category I:	CME Activities with Accredited Sponsorship, Credit hour limit, 60 minimum.
Category II:	CME Activities with non-Accredited Sponsorship, 45 hours.
Category III:	Medical Teaching,45 hours.
Category IV:	Books, Papers, Publications and Exhibits, 40 hours.
Category V:	Non-Supervised Individual CME Activities, 45 hours.
Category VI:	Other Meritorious Learning Experiences, 45 hours.

Continuing Education credits can be obtained through a variety of instructional processes. Naturally, the cost per credit hour and the efficiency and effectiveness of the programs will vary substantially. One of the most typical means of obtaining continuing medical education credit is through lecture/vacation format in which the physician attends seminars, papers, and conferences at a resort setting for a specifically programmed course. These are considered legitimate conferences and they may represent the most cost-inefficient means of obtaining continuing education for the health professional. Total cost per credit hour obtained can run as high as $200 or more.

Perhaps more important is the realization that a significant number of patient care hours are being lost on an annual basis by the distant site conference. Other methods of obtaining continuing education credits that are listed by AMA include audiovisual materials, bedside rounds, clinical conferences, laboratory work, live clinics, lectures, open question periods, observance of procedures, panel discussions, patient demonstration, performance procedures, seminars, radio-telephone, operative human surgery, television, and programmed instruction.

Computer Assisted Instruction is notably absent from this list as a method of obtaining continuing education credit. This comes as a very small surprise since the use of computer technology for obtaining continuing education credit is relatively new. Only within the last few years have computer course offerings begun to expand significantly. Accessability to institutions such as medical schools and hospitals which have computer assisted instructional programs has been limited, and the majority of health professionals lack familiarity with the use of computer based educational systems. Studies are being conducted throughout the country which are attempting to determine the feasibility of using computer based education as a means of obtaining continuing education in the health sciences. [2] The most notable project is the MERIT project. MERIT is an acronym for "medical evaluation and re-certification through individualized testing". The MERIT project is under the direction of Dr. William Harlis, University of the Pacific Medical Center in San Francisco. MERIT was established in 1973 at the American Board of Internal Medical Conference. Specifically, the MERIT project was designed to investigate:

1. an approach to re-certification whereby the specific patient problems of each internist will be the basis for the evaluation of his skills, knowledge, and clinical judgement.

2. the use of an advanced computer simulation of the physician-patient counter (CASE) as an exam'nation instrument for the individualized evaluation.
3. the development of a scoring system for CASE to access various dimensions of individual physical clinical behavior.

Initially 42 board certified internists agreed to participate in the project. The MERIT model now includes 5 major steps for each physician involved in the process:

1. the physician keeps a diary of 100 patients
2. an individual practice profile is developed from data describing practice.
3. the physician is given an individualized exam comprised of three cases.
4. the exam is scored and returned to the physician and the Board.
5. the Board makes re-certification decisions based on the data.

The setting for interaction between a physician and a computerized clinical case simulation requires simply the physician with a computer terminal. In order to begin interacting with a clinical case, the physician is given the clinical setting, some physical characteristics of the patient and the circumstances surrounding the visit. From this point forward the physician may conduct a totally unstructured, free-text interview over the patient's course and treatment. Essentially the physician has the opportunity to obtain a complete history, perform a physical examination, and other laboratory tests which he feels are appropriate.

After the physician obtains significant information, he may then proceed to offer a diagnosis and will then be asked for management procedures, both short and long-term. The initial results as reported were encouraging. The average length of time to complete three case simulations was three hours and 20 minutes. 93% of the participants rated the case simulation as an appropriate and desirable testing mechanism for re-certification. 88% felt the cases in their exam were representative of the patients in their practice. 82% felt their performances with the cases was similar to their behavior with actual patients.

[3]Additional field tests have been conducted including a recent test in April, 1976 where approximately 100 physicians in the state of Ohio were administered the examination through the facilities of the Ohio State University College of Medicine. Plans are being formalized for the future of the MERIT project and general recommendations are being submitted to the American Board of Internal Medicine which include a plan for a national field testing in conjection with the 1977 re-certification examination. This implies that in order to obtain re-certification an internist may be required in the future to successfully complete 3 computerized case simulations. Obviously this has far-reaching implications for all fields in the health sciences.

Computerized clinical case simulations will offer some interesting advantages over traditional forms of continuing education. The user of a clinical case simulation is involved in a very active instructional process since the health professional is essentially dealing with a real patient. The user cannot become a passive observer. In order to complete the diagnosis and treatment/management plan of any case, the health professional must obtain information and cannot passively observe a procedure or listen to remarks delivered by a colleague. As a result of this active process, the user obtains immediate feedback and reinforcement regardless whether his responses are complete or incorrect.

Obtaining continuing education credit through computer technology does not require airline tickets, cab fares, hotel reservations, or expensive dining. It merely requires the use of portable types of computer hardware. Essentially all that is requires is a computer terminal with a keyset, an acoustic coupler and access to a telephone. Once these requirements are met, a physician can dial into a computer system which offers the courseware he is seeking and begin interacting with the case simulation. Computer terminals are light weight and portable and may be either video type CRT's (Cathode Ray Tube) or small printing units. They may easily be moved from a medical library to an emergency room, to the department of Surgery or essentially anywhere within a hospital or medical school environment. Terminals are also available which may be taken home and be used to interact with a case simulation utilizing if necessary, a standard television receiver, as the CRT.

Another distinct advantage is the availability of computerized educational facilities. Case simulations can be accessed from Massachusetts General Hospital and Ohio State University on a 24-hour basis. This means that the nurse in an intensive care unit, a medical technologist in a laboratory or an emergency medical technician could access a case simulation at 3:00 a.m. The computer systems have the ability of providing communication between the user and the author of the program by allowing the physician or nurse to make comments at the completion of the simulation regarding the content or accuracy of the recommended therapies and management techniques that are presented throughout the simulation. This in-turn allows the author or programmer to make immediate updates to the programs within the computer system. Essentially in a short period of time, a computerized case simulation could be cleared of inaccuracies and updated and re-offered to users across the entire country. This would be virtually impossible to achieve through any other instructional means. [4]Massachusetts General Hospital lists over 73 hours of programs available for category I credit. Case simulations available from Massachusetts General Hospital include

abdominal pain, arrhythmias, coma, CPR, hypertension diagnosis, hypertensive emergencies, hypertension management, GI bleed, pediatric cough and fever, respiratory distress in the newborn, joint pain, fluid and electrolyte management, digitalis, arterial blood gas and trauma. Of primary concern to the medical student and physician is the realization that the patients on the computer are virtually indestructable. Results of management treatment and therapy may be given to the user immediately and although mismanagement may occur, no harm is done to the computer patient.

The Health Education Network offers courseware to medical schools, nursing schools, dental schools, hospitals, and health care institutions throughout the United States and Canada. One need only contract with either Ohio State University College of Medicine or Massachusetts General Hospital which are the host institutions. The user is entitled to immediate accessability to any of the clinical case simulations housed within those two systems.

There are a variety of formats of clinical case simulations. The simplest is a multiple choice format in which the user is presented with a patient and asked to begin interacting with pre-determined responses. The user may also be presented with an item/vocabulary list which is essentially a listing of pre-determined responses which can be chosen randomly in order to obtain a history, physical examination, lab and therapy procedures and, eventually a diagnosis. In this type of program, the user is not required to enter the entire vocabulary item, merely the corresponding number for that vocabulary. The most difficult and perhaps the most sophisticated types of program are those which require the user to request information in a free-text format. In these situations, the health professional interacts with the simulation in a real-life setting and is required to request information concerning history, physical examiniation, laboratory tests, etc. in a standard conversational format.

The health professional essentially is carrying on a conversation with a simulated patient and will receive an appropriate patient response.

Specialized programs can be developed. The physician can be questioned during the examination or help options may be available or a consultation can be obtained. The costs of laboratory tests can be presented to the physicians on the PLATO Health User Network and a final analysis of which laboratory tests were actually required and which were superficial.

The prospects of using computer technology to obtain continuing health education credit are very real and feasible compared to other means of obtaining CE credits. The costs are reasonable, accessibility to computer based education systems is increasing, and the quality and the quantity of computerized case simulations is rapidly improving. Once the initial fear of the use of suspiciously complex computer hardware is overcome, acceptance by the health science community of computer based continuing medical education may well be the next natural step.

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